Manifestation of IEEE Uttar Pradesh Section Young Professionals Star Award for the Month of October 2021

About Dr. Anurag Vijay Agrawal

Dr. Anurag Vijay Agrawal (M'2012 – SM'2022) received the B.Sc. Degree in Mathematics and Physics followed by B.E. Degree in Electronics and Communication Engineering with First Class in Honours from M.J.P. Rohilkhand University, Bareilly. He received his M.E. degree in Electronics and Communication Engineering from Panjab University, Chandigarh and Ph.D. from Department of Electronics and Communication Engineering at Indian Institute of Technology, Roorkee.

The topic of his research for M.E. was "Reconfigurable Rectangular to Polar Converter for Multiband and Multimode Wireless Communications using Linear Convergence," where a Rectangular to Polar Converter was designed, simulated, VHDL codes were developed, and the hardware synthesis was done on Xilinx Virtex2 FPGA using Xilinx ISE 10.1.

His Ph.D. research topic is "Energy-Efficient MIMO/Massive MIMO Communication with Practical Power Amplifiers for Intelligent Transportation Systems". The research work comprises a three-way analysis covering the effect of mobility on various antenna configurations, the linearization effect at various mobilities, and the impact of different multiple-input multiple-output (MIMO) configurations. The work reports that the energy required to drive power amplifiers (PAs) for reliable broadband communications at higher speeds is more, even with the digital pre-distortion (DPD) technique. The proposed model is simple and sufficiently accurate and provides an end-to-end performance in the presence of both DPD and PA.

From August 2001 to March 2012, he was serving as Lecturer and then as Assistant Professor at Kunwar Satya Vira College of Engineering and Management, Bijnor (U.P.). He has worked as Senior Manager (ICT and Entrepreneurship) with KIS Campus (Kheman International Society), Bijnor (U.P.) from April 2012 till his selection for Ph.D. programme at IIT Roorkee in December 2014.

He worked as a Teaching Assistant for Advanced Digital Filter Theory and Software Defined Radios subjects at IIT Roorkee from 2015 to 2020. Presently, he has been working as Program Manager, Electronics & ICT Academy, IIT Roorkee from March 2022. The Academy is an initiative supported by MeitY, Government of India, to train teachers, students, and working professionals through online and classroom modes. Dr. Agrawal works for MoUs with Universities, colleges, government departments, and professional bodies. He has been designing and implementing courses based on contemporary and emerging technologies and organizing technical and academic events involving faculty, industries, MSMEs, and students. He is responsible for the execution and administration of training programmes, curriculum development, interaction with industry representatives and Government organizations for collaboration and planning, coordination with academy staff to ensure successful project management and the academy's day-to-day activities.

He has filed/published/registered two patents, four designs, two copyrights, two books (one Indian and another United States publication), five international journal papers, five international conference papers.

His research interests include Digital Predistortion, RFPA Linearization, MIMO/Massive MIMO Communications, Green Communications, Intelligent Transportation Systems, High-Speed Railways Communication, 5G/6G Signal Generation and Enhancement, Machine Learning for Signal Processing. Dr. Agrawal is Senior Member, Institute of Electrical and Electronics Engineers (USA) [92480439, since 2022], Life Member, Indian Science Congress Association (India) [21240, since 2012], Life Member, The Institution of Engineers (India) [M-1533988, since 2015], Life Member, The Indian Society for Technical Education (India) [LM 58246, since 2008], Global Member, Internet Society (USA) [Global 577, since 2007], and Life Member, International Association of Engineers (Hongkong) [64075, since 2007].

He was an Ambassador, IEEE Day from IEEE UP Section in 2019. He got selected three times consecutively (2016, 2017, and 2018) as a Fellow of the India School on Internet Governance. He served as Chair, IIT Roorkee IEEE ComSoc Student Branch Chapter [2017-2021]. He was a Senator, Students' Affairs Council, IIT Roorkee [2016-2017] and a Member, Coordinating Committee of Bhawans, IIT Roorkee [2016-2017]. He has been authorized to use the title and work as Chartered Engineer (India) since 2016. He is a Member, LITD 29 Block chain and Distributed Ledger Technologies Sectional Committee, Bureau of Indian Standards, since 2017. He has been a Member, IEEE Smart Cities Marketing and Education Committee, since 2021.

He has been part of Indian Delegation for the plenary and WG meetings of ISO/TC 307 Blockchain and distributed ledger technologies (May-June 2022, Virtual Plenary) at ISO, the International Organization for Standardization.

1. What are your words of motivation?

Bhagavad Gita (The Song of God), pronounced generally as Gita, is an epic

scripture. It was considered as a spiritual dictionary by Mahatma Gandhi and was a book of motivation for many leaders of the Indian Independence movement. The Bhagavad Gita Quotes are motivational for every person whoever want to be on the right path in her/his life and looking for inspiration to keep her/him motivated towards the goal. I admire the Bhagavad Gita quotes "If you want to be Great, Think Great and Positive" "You are what you believe in, you become that which you believe you can become".

2. What was the specific reason, if any, which made you, join IEEE?

During my post-graduation, I happened to be the Student Member of IEEE. I attended many IEEE events, volunteered a few also and realize that IEEE is a good means to know about emerging technologies in the world of engineering research and advancements.

3. As a Young Professional, how do you position your interest in your own field with the activities and services you perform as an IEEE member/ volunteer?

When I joined IIT Roorkee for Ph.D. programme, then I become the Founder Chair, IIT Roorkee IEEE ComSoc Student Branch Chapter. I have organized many programmes including Guest Lectures, Quiz Competitions, IEEE Day celebrations, Discussion Forums and then realized that IEEE does not only provide opportunities to learn about latest developments in the engineering and technical areas but it is also a means for socializing and networking. It is a means to connect with the society and to make them learn about Science and Technology.

4. What are your thoughts about IEEE membership and its paybacks? Whether the IEEE membership benefited you at any time in your career growth? If so, how?

IEEE membership provides discounts in various conferences, opportunities to volunteer in areas of your interest for the events in not only your state or country but worldwide. The discussions, interactions and brain-storming with IEEE members from different geographical locations imbibe you with extra-ordinary skills. I started my Ph.D. research in the area of non-linearity of power amplifiers and somehow, with guidance and cooperation of my esteemed Supervisor, relate it to Intelligent Transportation Systems and High-Speed Transportation Engineering.

5. As a Young Professional, what are the changes or developments you would like to see in evolving this professional body as a group devoted to humanity and its causes?

I strongly believe that IEEE student membership should be open to pre-university students (Polytechnics and school-going students) to make them know and involve in IEEE activities much earlier. This early involvement with Society will surely generate new ideas for serving humanity.

6. What are your suggestions and recommendations for those young professionals who may aspire to join IEEE?

Try to volunteer and/or attend activities in your Student Branch Chapter or Student

Branch. Try to involve with State section, attend IEEE conferences. It will not only make one technologically advanced but may open new areas of opportunities for professional advancement.

7. As a Young Professional and a young researcher in the field, how do you consider the prospects of scientific research in this field for the benefit of humanity?

It's my personal opinion that when a young professional or a young researcher attends any scientific event or programme, he knowing or unknowingly wishes to apply it for the society as compared to the older researchers. Today IEEE itself provides ample opportunities through IEEE Special Interest Group on Humanitarian Technology (SIGHT) and IEEE Humanitarian Activities Committee (HAC) to work for the benefit of humanity.

8. What is your recent exciting research works that may have significant societal impact?

I have recently applied Copyrights on "End-to-end Wireless Communication using Green Power Amplifiers for High-Speed Ground Transportation in 5G era" and "Green High Speed Transportation Engineering using MIMO/Massive MIMO Antenna Technology for Smart Cities in 5G era." I also got published one patent "Green High Speed Railways Communication by Mitigating Power Amplifier Nonlinearity for MIMO transceivers" last year. These works provide Energy Efficiency optimization analysis by utilizing the zero-forcing linear processing scheme for a downlink Massive MIMO system. The numerical results reveal that the Doherty PAs are the perfect choice to realize energy-efficient 5G and beyond communications. The works represent diverse transportation scenarios, viz. pedestrian, highway, and the HSR corresponding to the femto, pico, and microcells. The works pave the way for achieving Green Communications in high mobility scenarios.

9. What's the advice you would give to a young professional who is just starting his/ her career?

IEEE Young Professionals is a group that includes members from recent university graduates to experienced professionals and entrepreneurs. It makes the group highly diverse and one can learn and work in diverse areas to make her/his research more impactful. Additionally, IEEE Young Professionals provides grant upto $1500 for events, where members can expand their professional networks.

10. Anything else that you would like to add?

We may plan to start credit-based training programs under Uttar Pradesh IEEE Section, approved by Industry/ University/ Government Bodies like UGC or AICTE for young professionals and students.